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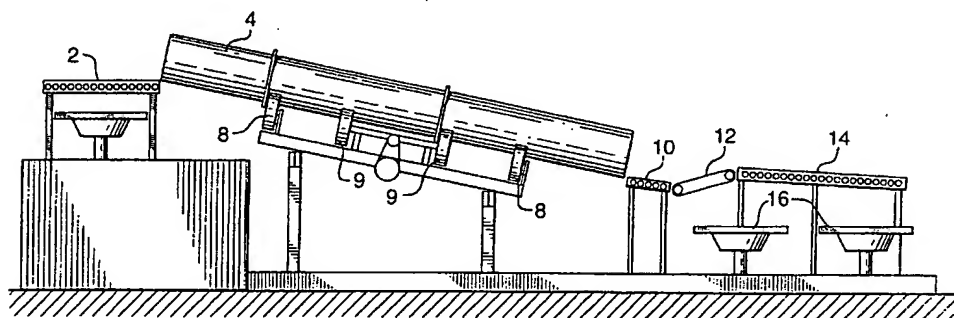
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(51) Int. Cl.⁶ B44F 11/06, C04B 14/28, B28D 1/00

(54) **PIERRE ARTIFICIELLE ET METHODE ET INSTALLATION
POUR LA PRODUCTION DE CELLE-CI**

(54) **ARTIFICIAL STONE AND METHOD AND APPARATUS FOR
PRODUCING SAME**



(57) An artificial stone having a chiselled, rough-hewn look on the edges, corners and exposed faces of the product, is produced by preparing a concrete block and then fracturing it, preferably along one plane, to produce a somewhat rough face along the fracture. The fractured block is then placed into the upper end of an inclined rotating cylindrical tunnel, the tunnel having at least one and preferably two internal longitudinal ribs to initially lift the block and then produce tumbling as the tunnel rotates, the block gradually moving along the tunnel towards a lower exit end. The multiple impacts and abrasions within the tunnel produce the desired degree of additional texturing and rounding of corners and edges, to provide the desired natural aesthetic appearance. Preferably, one or both of the angle of the tunnel and the speed of rotation are adjustable, to permit variations and optimization.

This invention relates to the production of an artificial stone, starting from a conventional concrete block made from a conventional concrete block manufacturing machine.

5 The manufacture of concrete or cement blocks is a well-known conventional process. However, cement blocks are generally not very appealing visually. The inventor recognized that there was a need for an artificial stone which could be produced in quantity and at reasonable cost, via a process similar to conventional cement block manufacture, but
10 with additional steps to produce an aesthetic appearance, with a strong resemblance to natural stone, i.e. with a chiselled, rough-hewn look on the edges, corners and exposed faces of the product.

The inventor first tried a number of processes,
15 without success. The first process involved a flat skid plate on a sixty degree angle. The product bounced and rolled down the skid plate, and piled up at the bottom. This process failed to achieve the desired result.

A second process involved hammers on wheels, the
20 hammers beating the face of the product as it passed by on a conveyor belt. This also failed.

A third process used the same conveyor belt, but with percussion heads mounted on the rods of air cylinders. The percussion heads were thrust into the face of the
25 product as it passed by, activation of the percussion heads being controlled by "electric eyes" sensing the arrival and departure of the product. The cylinders were mounted at various angles to provide the appearance of random impacts. The end appearance of the product was nearly acceptable, but
30 suitable production volumes could not be achieved.

A fourth process used wheels similar to those on a paddlewheel boat, which picked up the product and dropped it on the other side. Experiments were conducted with up to four paddlewheels in line, but again the results were
35 unsatisfactory.

A fifth process involved a screen on a slight angle, to which vibrators were installed to bounce the product as it passed over the screen. This also failed. At this point, the

inventor was becoming very discouraged, but still further efforts led to the present invention.

5 It is an object of the invention to produce an artificial stone, with a chiselled, rough-hewn look on the edges, corners and exposed faces of the product.

It is a further object of the invention to provide a suitable formulation for such artificial stone.

10 It is a further object of the invention to provide apparatus which may be used to carry out the process in an efficient manner.

15 In the invention, a generally conventional concrete block is first prepared and is then fractured, preferably along one plane, to produce a somewhat rough face along the fracture. The fractured block is then placed into the upper end of an inclined rotating cylindrical tunnel, the tunnel having at least one and preferably two internal longitudinal ribs to initially lift the block and then produce tumbling as the tunnel rotates, the block gradually moving along the tunnel towards a lower exit end. The multiple impacts and
20 abrasions within the tunnel produce the desired degree of additional texturing, rounding of corners and edges, etc., to provide the desired natural aesthetic appearance.

25 Preferably, one or both of the angle of the tunnel and the speed of rotation are adjustable, to permit variations and optimization.

The concrete mix is generally conventional, and almost any conventional zero-slump mix may be employed, but preferably certain additives are employed, such as a water repellent, a plasticizer, and/or color.

30 Further features of the invention will be described or will become apparent in the course of the following detailed description.

35 In order that the invention may be more clearly understood, the preferred embodiment thereof will now be described in detail by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a side view of the apparatus used to carry out the process of the invention;

Fig. 2 is a top view of the apparatus;

Fig. 3 is an end view of the apparatus; and

5 Fig. 4 is a cross-section of the tunnel.

The invention starts with a preferred mix of crushed limestone and manufactured sand. Two additives are introduced to obtain plasticity and water repellency, and color is introduced into the aggregates to reproduce the colors of natural stone. Water and cement are added to complete the mix. The preferred mix is as follows:

2,000 lbs.	Manufactured concrete sand
2,000 lbs.	Crushed limestone screenings
50 oz.	Water repellent additive (for example, Euclid's Euco 200 (trademark))
400 lbs.	Hi-early cement
16 oz.	Plasticizer (for example, Guelph Soap Company's Solar (trademark))
12 lbs.	Concrete color (dry pigment or slurry type)
Water	To required volume

These products are blended to form a zero slump concrete mix that is introduced into molds of various sizes and shapes for the initial product. The product is promptly removed from the molds and is then fully cured in curing chambers with live steam and heat to achieve cement hydration and binding of the material. This is as in conventional manufacture of concrete blocks.

The product is then fractured to provide a textured split face profile prior to placement onto wooden pallets for ease of handling. For example, a 16 x 8 x 4 block would be fractured along its length to produce two blocks each 16 x 4 x 4. Fracturing of course does not always work out perfectly, but that is useful in this case because the random pieces can be used to provide odd or irregular shapes, to further enhance the natural appearance.

After fracturing, the product is transferred to the apparatus illustrated in the accompanying drawings, for further processing and transformation into the rough-hewn appearance of natural stone.

5 The product is placed onto a gravity roller conveyor 2 which introduces the product into the upper end of an inclined rotating cylindrical tunnel 4. The tunnel in the preferred embodiment is 24 inches in diameter and 20 feet long. The tunnel preferably rotates at 16 r.p.m., but the
10 rotation speed preferably is variable, in order to achieve the optimum r.p.m. to produce the desired end result, based on the density of the product being processed. The inside of the tunnel has two 1/2 inch by 2 inch flat bars 6 running
15 lengthwise along the tunnel. Each bar stands upright inside the tube with the other directly opposite on the inside wall of the tunnel. The tunnel is supported and rotated by rubber tires, some of which are idler wheels 8, and some of which are drive wheels 9 to rotate the tunnel.

20 The tunnel is on an angle, preferably about fifteen degrees from the horizontal, but preferably adjustable depending on the flow speed or dwell time required for the product inside the tunnel.

25 As the product enters the tunnel, it is lifted by one of the bars 6 and carried upwardly until it falls. By virtue of the bars, the rotation of the tunnel, and the incline of the tunnel, the product tumbles its way along the tunnel, making numerous revolutions before exiting. During these revolutions, the product drops onto the tunnel wall and other pieces of the product at various angles, and the pieces
30 scrub against each other as well. These impacts and scrubbing produce the desired textured, rough-hewn appearance and rounded edges and corners.

35 At the lower end of the tunnel, the product exits onto cleaning rollers 10 prior to entry onto a power belt conveyor 12. This power belt conveyor feeds a gravity roller conveyor 14 from which the completed product is loaded onto wooden pallets for delivery.

At the loading area, turntables 16 preferably are provided, to ease the steps of the labourers. The operator simply fills wooden pallets on the nearest side, then spins the pallet 180 degrees on the turntable and fills the other side.

The completed pallet preferably is wrapped in plastic for ease and safety of handling, as well as keeping all contaminants away from the product prior to its placement in the wall.

Presently preferred sizes for the product are 16 inches long by 8 inches high, and either 4, 6, 8, 10 or 12 inches wide. Other common sizes include 4 x 4 x 5; 4 x 4 x 10; 4 x 4 x 16; 3 x 4 x 12; 4 x 4 x 8; and 4 x 10 x 8. Clearly, the invention is not restricted to any particular size of product, however.

Depending on the size of the product, the angle of tunnel and speed of rotation may be varied, via routine trial and error, to produce the desired end appearance. For any given size of produce, the angle and or speed may of course be varied as desired, to produce variations in appearance. In general, larger blocks are produced with a smaller angle and slower speed than smaller blocks.

It will be appreciated that the above description relates to the preferred embodiment by way of example only. Many variations on the invention will be obvious to those knowledgeable in the field, and such obvious variations are within the scope of the invention as described and claimed, whether or not expressly described.

For example, it should be clearly understood that the dimensions, angle and rpm of the tunnel are not critical, except to the extent that they must be adjusted through routine experimentation to achieve the desired appearance for any particular size of block.

It should also be understood that the invention is not restricted to the specific concrete mix mentioned above, the process being adaptable to almost any typical mix design

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for manufactured products, nor are the preferred additives essential, although they are desirable.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE
PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A method of producing an artificial stone from a concrete block, comprising the steps of:
 - 5 preparing a generally conventional concrete block;
 - fracturing said block to produce a somewhat rough face along the fracture;
 - placing said block into an upper end of an inclined rotating cylindrical tunnel, said tunnel having at least one
 - 10 internal longitudinal rib to initially lift said block and then produce tumbling as said tunnel rotates, said tumbling and abrasion with other blocks producing additional texturing of said block and resulting in rounded edges and corners, said block gradually moving along said tunnel towards a lower exit
 - 15 end by virtue of said tumbling and the incline of said tunnel; and
 - removing said block from said lower exit end.
2. A method as recited in claim 1, further comprising adjusting the parameters of rotation speed or of angle of
- 20 incline of said tunnel to produce a desired end appearance, at least one of said parameters being adjustable.
3. A method as recited in claim 2, where the speed of rotation of said tunnel is adjustable.
4. A method as recited in claim 2, where the angle of
- 25 incline of said tunnel is adjustable.
5. A method as recited in claim 2, where the speed of rotation of said tunnel is adjustable, and the angle of incline of said tunnel is adjustable.
6. A method as recited in claim 1, where said tunnel is
- 30 rotated at approximately 16 r.p.m..

7. A method as recited in claim 1, where said tunnel is inclined at approximately 15 degrees from the horizontal.

8. A method as recited in claim 1, where said tunnel is
5 rotated at approximately 16 r.p.m., and where said tunnel is inclined at approximately 15 degrees from the horizontal.

ABSTRACT

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5 An artificial stone having a chiselled, rough-hewn
look on the edges, corners and exposed faces of the product,
is produced by preparing a concrete block and then fracturing
it, preferably along one plane, to produce a somewhat rough
face along the fracture. The fractured block is then placed
into the upper end of an inclined rotating cylindrical tunnel,
the tunnel having at least one and preferably two internal
longitudinal ribs to initially lift the block and then produce
10 tumbling as the tunnel rotates, the block gradually moving
along the tunnel towards a lower exit end. The multiple
impacts and abrasions within the tunnel produce the desired
degree of additional texturing and rounding of corners and
edges, to provide the desired natural aesthetic appearance.
15 Preferably, one or both of the angle of the tunnel and the
speed of rotation are adjustable, to permit variations and
optimization.

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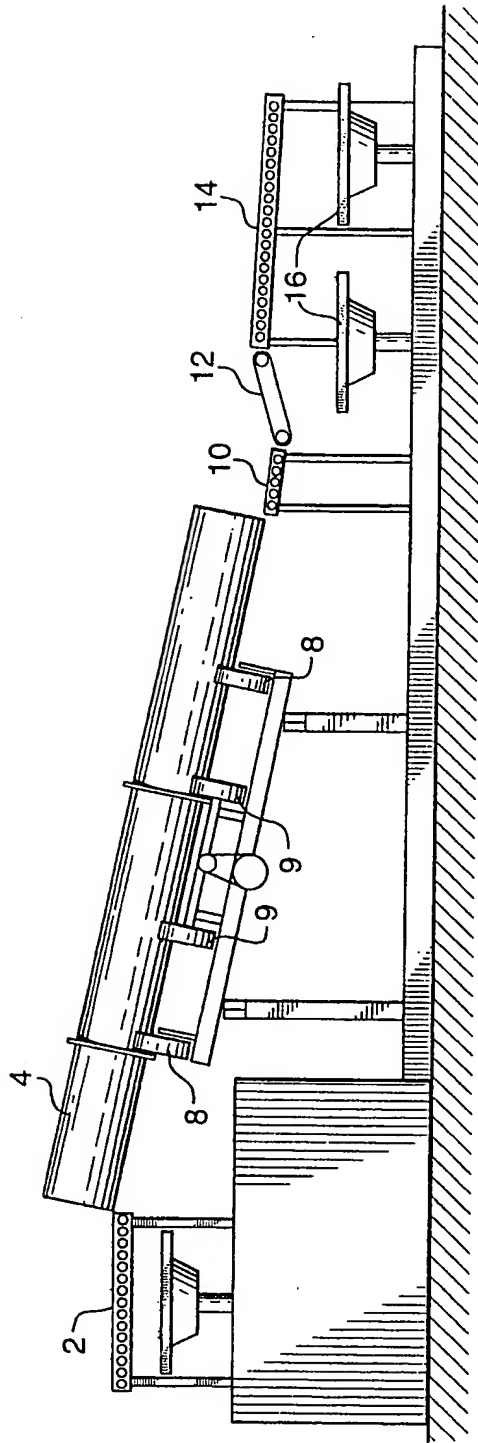


FIG.1.



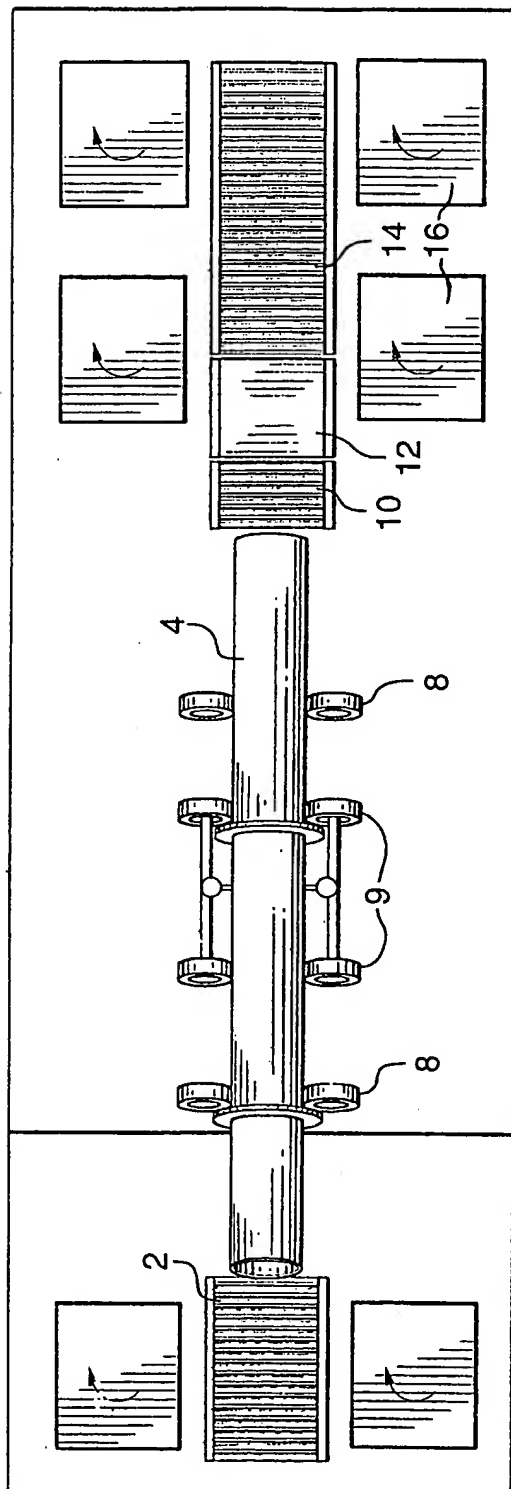


FIG.2.

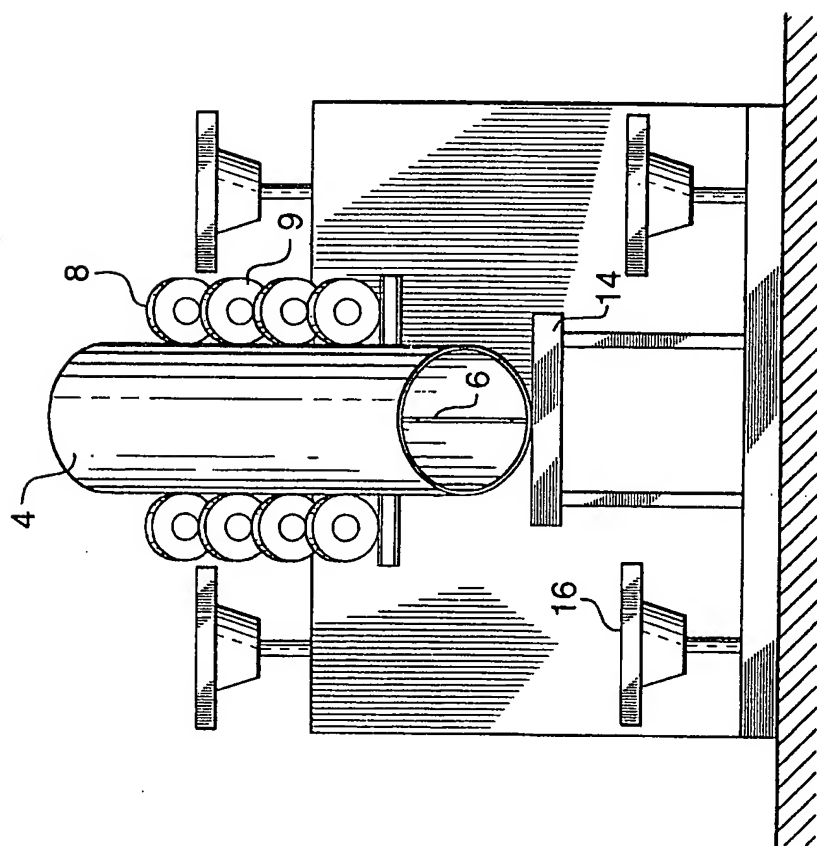


FIG. 3.

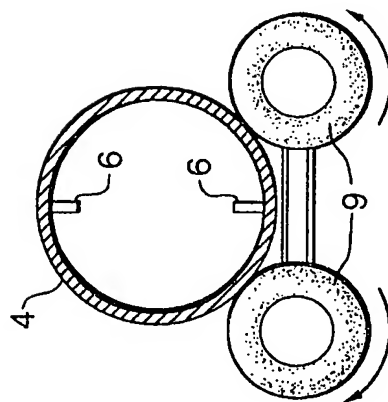


FIG. 4.